

Discipline: <b>EE</b>	Semester: 5th	Name of the Teaching Faculty: <b>SRI SUBODH KANTA BARIK</b>
Subject: <b>POWER ELECTRONICS AND PLC</b>	No. of Days/per week class allotted: <b>04</b>	No. of Weeks : <b>15</b>
<b>Week</b>	<b>Class Day</b>	<b>Theory Topics</b>
<b>1<sup>st</sup></b>	<b>01</b>	<b>Unit 1: UNDERSTAND THE CONSTRUCTION AND WORKING OF POWER ELECTRONIC DEVICES</b> Construction, Operation, V-I characteristics & application of power diode,
	<b>02</b>	Construction, Operation, V-I characteristics & application of SCR
	<b>03</b>	Construction, Operation, V-I characteristics & application of DIAC & TRIAC
	<b>04</b>	Construction, Operation, V-I characteristics & application of Power MOSFET
<b>2<sup>nd</sup></b>	<b>01</b>	Construction, Operation, V-I characteristics & application of GTO
	<b>02</b>	Construction, Operation, V-I characteristics & application of IGBT
	<b>03</b>	Two transistor analogy of SCR.
	<b>04</b>	Gate characteristics of SCR.
<b>3<sup>rd</sup></b>	<b>01</b>	Switching characteristic of SCR during turn on and turn off.
	<b>02</b>	Switching characteristic of SCR during turn on and turn off.
	<b>03</b>	Turn on methods of SCR.
	<b>04</b>	Turn off methods of SCR (Line commutation and Forced commutation)
<b>4<sup>th</sup></b>	<b>01</b>	Voltage and Current ratings of SCR.
	<b>02</b>	Protection of SCR, Over voltage protection
	<b>03</b>	Over current protection, Gate protection
	<b>04</b>	General layout diagram of firing circuit, R firing circuits, RC firing circuits
<b>5<sup>th</sup></b>	<b>01</b>	UJT pulse trigger circuit, Synchronous triggering (Ramp Triggering )
	<b>02</b>	Design of Snubber Circuits
	<b>03</b>	<b>Unit 2: UNDERSTAND THE WORKING OF CONVERTERS, AC REGULATORS AND CHOPPERS.</b> Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual Converter
	<b>04</b>	Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual Converter
<b>6<sup>th</sup></b>	<b>01</b>	Working of single-phase half wave controlled converter with Resistive and R-L loads.
	<b>02</b>	Understand need of freewheeling diode.

	03	Working of single phase fully controlled converter with resistive and R- L loads.
	04	Working of three-phase half wave controlled converter with Resistive load
7 <sup>th</sup>	01	Working of three phase fully controlled converter with resistive load.
	02	Working of single phase AC regulator.
	03	Working principle of step up & step down chopper.
	04	Control modes of chopper
8 <sup>th</sup>	01	Operation of chopper in all four quadrants.
	02	Problems
	03	<b>Unit 3: UNDERSTAND THE INVERTERS AND CYCLO-CONVERTERS</b> Classify inverters.
	04	Explain the working of series inverter.
9 <sup>th</sup>	01	Explain the working of parallel inverter.
	02	Explain the working of single-phase bridge inverter.
	03	Explain the basic principle of Cyclo-converter.
	04	Explain the working of single-phase step up & step down Cyclo-converter.
10 <sup>th</sup>	01	Applications of Cyclo-converter.
	02	Problems
	03	<b>Unit 4: UNDERSTAND APPLICATIONS OF POWER ELECTRONIC CIRCUITS</b> List applications of power electronic circuits.
	04	List the factors affecting the speed of DC Motors.
11 <sup>th</sup>	01	Speed control for DC Shunt motor using converter.
	02	Speed control for DC Shunt motor using chopper.
	03	List the factors affecting speed of the AC Motors.
	04	Speed control of Induction Motor by using AC voltage regulator.
12 <sup>th</sup>	01	Speed control of induction motor by using converters and inverters (V/F control)..
	02	Working of UPS with block diagram.
	03	Battery charger circuit using SCR with the help of a diagram.
	04	Basic Switched mode power supply (SMPS) - explain its working & applications
13 <sup>th</sup>	01	<b>Unit 9: PLC AND ITS APPLICATIONS</b> Introduction of Programmable Logic Controller(PLC)
	02	Advantages of PLC, Different parts of PLC by drawing the Block diagram and purpose of each part of PLC.
	03	Applications of PLC, Ladder diagram
	04	Description of contacts and coils in the following states i)Normally open ii) Normally closed iii) Energized output iv)latched Output v)branching

14 <sup>th</sup>	01	Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate.
	02	Ladder diagrams for combination circuits using NAND,NOR, AND, OR and NOT
	03	Timers-i)T ON ii) T OFF and iii)Retentive timer, Counters-CTU, CTD
	04	Ladder diagrams using Timers and counters
15 <sup>th</sup>	01	PLC Instruction set
	02	Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller
	03	Special control systems- Basics DCS & SCADA systems
	04	Computer Control–Data Acquisition, Direct Digital Control System (Basics only)